CLAIMS

1.   A moving picture stream generation apparatus for generating a stream including pictures that constitute a moving picture, said apparatus comprising:

5   a supplemental information generation unit operable to generate, on a random access unit basis, supplemental information to be referred to at the time of playback of each random access unit, each random access unit including one or more pictures; and

a stream generation unit operable to generate a stream
10   including the generated supplemental information and the pictures by adding the supplemental information to each corresponding random access unit,

wherein, at a top of each random access unit, an intra coded picture that can be decoded without depending on any picture is
15   placed, and

the supplemental information includes information for specifying pictures to be decoded at the time when the pictures included in each random access unit are played back in trick-play.

20   2.   The moving picture stream generation apparatus according to Claim 1,

wherein the trick-play includes at least one of: jump-in playback; variable-speed playback; and reverse playback.

25   3.   The moving picture stream generation apparatus according to Claim 2,

wherein each of the pictures is composed of sub-picture units, and

said stream generation unit is operable to store the
30   supplemental information into a first sub-picture unit different from a second sub-picture unit for storing a pixel value of each of the pictures.

4.   The moving picture stream generation apparatus according to Claim 3,

wherein each random access unit is one or more pictures, and

said stream generation unit is operable to store the supplemental information into a top picture included in each random access unit.

5.   The moving picture stream generation apparatus according to Claim 4,

wherein the supplemental information includes information for specifying pictures to be decoded at the time of playback of each random access unit at a specific speed.

6.   The moving picture stream generation apparatus according to Claim 4,

wherein the supplemental information includes information indicating picture priorities based on which each random access unit is played back.

7.   The moving picture stream generation apparatus according to Claim 4,

wherein the supplemental information includes pieces of information indicating picture types of all the pictures included in each random access unit, the pieces of information being placed in an order that corresponds to a decoding order of the pictures.

8.   The moving picture stream generation apparatus according to Claim 7,

wherein the picture types include:

an I picture on which intra coding is performed;

a P picture on which inter coding is performed with reference

to one picture per block, the block being a basic unit in coding;

a reference B picture on which inter coding is performed with reference to two pictures per block, the block being a basic unit in coding, and the reference B picture being a picture that is referred to

5   by another picture; and

a non-reference B picture on which inter coding is performed with reference to two pictures per block, the block being a basic unit in coding, and the non-reference B picture being a picture that is not referred to by another picture.

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9.   The moving picture stream generation apparatus according to Claim 4,

wherein the supplemental information includes pieces of information indicating picture structure types of all the pictures

15 included in each random access unit, the pieces of information being placed in an order that corresponds to a decoding order of the pictures.

10.   The moving picture stream generation apparatus according to

20 Claim 9,

wherein the picture structure types include at least: a field structure; and a frame structure.

11.   The moving picture stream generation apparatus according to

25 Claim 10,

wherein, the picture structure types further include

a frame structure with information indicating whether a picture has a display field equivalent to two pictures or the picture has a display field equivalent to three pictures, in the case where the

30 picture has a frame structure.

12.   The moving picture stream generation apparatus according to

Claim 1, said apparatus further comprising

a sequence parameter set addition unit operable to add, to each random access unit, a sequence parameter set that is a group of parameters concerning one or more pictures,

5   wherein the sequence is made up of pictures that starts with a special picture at which all statuses needed for decoding are reset, and ends with a picture that is placed immediately before a next special picture.

10   13.   The moving picture stream generation apparatus according to Claim 12,

wherein each random access unit consists of one or more pictures, and

said sequence parameter set addition unit is operable to store
15   one sequence parameter set that is referred to by every picture in the random access unit only into a top picture included in each random access unit.

14.   A moving picture stream generation apparatus for generating
20   a stream including pictures that constitute a moving picture, said apparatus comprising

a sequence parameter set addition unit operable to generate a moving picture stream including sequence parameter sets by adding the sequence parameter sets, on a random access unit basis,
25   each of the sequence parameter sets being a group of parameters concerning one or more pictures,

wherein the sequence is made up of pictures that starts with a special picture at which all statuses needed for decoding are reset, and ends with a picture that is placed immediately before a next
30   special picture.

15.   The moving picture stream generation apparatus according to

Claim 14,

     wherein each random access unit consists of one or more pictures, and

     said sequence parameter set addition unit is operable to store

5   one sequence parameter set that is referred to by every picture in the random access unit only into a top picture included in each random access unit.

     16.   A moving picture stream generation method for generating a

10   stream including pictures that constitute a moving picture, said method comprising:

     generating, on a random access unit basis, supplemental information to be referred to at the time of playback of each random access unit, each random access unit including one or more

15   pictures; and

     generating a stream including the generated supplemental information and the pictures by adding the supplemental information to each corresponding random access unit,

     wherein, at a top of each random access unit, an intra coded

20   picture that can be decoded without depending on any picture is placed, and

     the supplemental information includes information for specifying pictures to be decoded at the time when the pictures included in each random access unit are played back in trick-play.

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     17.   A program for use with a moving picture stream generation apparatus for generating a stream including pictures that constitute a moving picture, the program causing a computer to execute a moving picture stream generation method which includes:

30   generating, on a random access unit basis, supplemental information to be referred to at the time of playback of each random access unit, each random access unit including one or more

pictures; and

generating a stream including the generated supplemental information and the pictures by adding the supplemental information to each corresponding random access unit,

5 wherein, at a top of each random access unit, an intra coded picture that can be decoded without depending on any picture is placed, and

the supplemental information includes information for specifying pictures to be decoded at the time when the pictures 10 included in each random access unit are played back in trick-play.

18. A moving picture coding apparatus for coding pictures that constitute a moving picture, said apparatus comprising:

a supplemental information generation unit operable to 15 generate, on a random access unit basis, supplemental information to be referred to at the time of playback of each random access unit, each random access unit including one or more pictures; and

a coding unit operable to code the generated supplemental information and the pictures, and operable to generate a stream 20 including the coded supplemental information and the pictures by adding the supplemental information to each corresponding random access unit,

wherein, at a top of each random access unit, an intra coded picture that can be decoded without depending on any picture is 25 placed, and

the supplemental information includes information for specifying pictures to be decoded at the time when the pictures included in each random access unit are played back in trick-play.

30 19. A moving picture coding method for coding pictures that constitute a moving picture, said method comprising:

generating, on a random access unit basis, supplemental

information to be referred to at the time of playback of each random access unit, each random access unit including one or more pictures; and

coding the generated supplemental information and the pictures, and generating a stream including the coded supplemental information and the pictures by adding the supplemental information to each corresponding random access unit,

wherein, at a top of each random access unit, an intra coded picture that can be decoded without depending on any picture is placed, and

the supplemental information includes information for specifying pictures to be decoded at the time when the pictures included in each random access unit are played back in trick-play.

20. A program for a moving picture coding apparatus for coding pictures that constitute a moving picture, the program causing a computer to execute a moving picture coding method which includes:

generating, on a random access unit basis, supplemental information to be referred to at the time of playback of each random access unit, each random access unit including one or more pictures; and

coding the generated supplemental information and the pictures, and generating a stream including the coded supplemental information and the pictures by adding the supplemental information to each corresponding random access unit,

wherein, at a top of each random access unit, an intra coded picture that can be decoded without depending on any picture is placed, and

the supplemental information includes information for specifying pictures to be decoded at the time when the pictures included in each random access unit are played back in trick-play.

21.   A moving picture multiplexing apparatus for coding pictures that constitute a moving picture, said apparatus comprising:

a supplemental information generation unit operable to generate, on a random access unit basis, supplemental information to be referred to at the time of playback of each random access unit, each random access unit including one or more pictures;

a coding unit operable to code the generated supplemental information and the pictures, and operable to generate a stream including the coded supplemental information and the pictures by adding the supplemental information to each corresponding random access unit,

a packetization unit operable to packetize the generated coded stream, and

a multiplexing unit operable to generate management information storing at least one of the following: playback time information of pictures in the packetized coded stream; size information of the pictures ; and start address information of each random access unit, and operable to multiplex the management information and the packetized coded stream into different areas,

wherein, at a top of each random access unit, an intra coded picture that can be decoded without depending on any picture is placed, and

the supplemental information includes information for specifying pictures to be decoded at the time when the pictures included in each random access unit are played back in trick-play.

22.   A moving picture multiplexing method for coding pictures that constitute a moving picture, said method comprising:

generating, on a random access unit basis, supplemental information to be referred to at the time of playback of each random access unit, each random access unit including one or more

pictures;

coding the generated supplemental information and the pictures, and generating a stream including the coded supplemental information and the pictures by adding the supplemental information to each corresponding random access unit;

packetizing the generated coded stream; and

generating management information storing at least one of the following: playback time information of pictures in the packetized coded stream; size information of the pictures; and start address information of each random access unit, and operable to multiplex the management information and the packetized coded stream into different areas,

wherein, at a top of each random access unit, an intra coded picture that can be decoded without depending on any picture is placed, and

the supplemental information includes information for specifying pictures to be decoded at the time when the pictures included in each random access unit are played back in trick-play.

23. A program for a moving picture multiplexing apparatus for coding pictures that constitute a moving picture, the program causing a computer to execute a moving picture multiplexing method which includes:

generating, on a random access unit basis, supplemental information to be referred to at the time of playback of each random access unit, each random access unit including one or more pictures;

coding the generated supplemental information and the pictures, and generating a stream including the coded supplemental information and the pictures by adding the supplemental information to each corresponding random access unit;

packetizing the generated coded stream; and

generating management information storing at least one of the following: playback time information of pictures in the packetized coded stream; size information of the pictures; and start address information of each random access unit, and operable to multiplex the management information and the packetized coded stream into different areas,

wherein, at a top of each random access unit, an intra coded picture that can be decoded without depending on any picture is placed, and

the supplemental information includes information for specifying pictures to be decoded at the time when the pictures included in each random access unit are played back in trick-play.

24.   A moving picture decoding apparatus for decoding and playing back a stream including pictures that constitute a moving picture, said apparatus comprising:

an instruction obtainment unit operable to obtain an instruction indicating that trick-play should be performed;

an analysis unit operable to analyze, by demultiplexing, supplemental information on a random access unit basis, each random access unit constitutes the stream;

a playback picture specification unit operable to specify pictures, among pictures included in each random access unit, which are needed for trick-play indicated by the instruction obtained by said instruction obtainment unit, based on an analysis result obtained by said analysis unit; and

a decoding unit operable to decode and play back the pictures specified by said playback picture specification unit,

wherein, at a top of each random access unit, an intra coded picture that can be decoded without depending on any picture is placed, and

the supplemental information includes information for

specifying pictures to be decoded at the time when the pictures included in each random access unit are played back in trick-play.

25. The moving picture decoding apparatus according to Claim 24,

wherein said playback picture specification unit is operable to specify pictures needed for trick-play based on a predetermined rule, in the case where said analysis unit analyzes a random access unit and obtains a result that the random access unit does not include supplemental information.

26. The moving picture decoding apparatus according to Claim 24, said apparatus further comprising

a random access unit specification unit operable to extract, from the stream, a sequence parameter set that is a group of parameters concerning one or more pictures, and operable to specify a random access unit including a picture, as a top picture, in which the extracted sequence parameter set is included,

wherein said playback picture specification unit is operable to specify the top picture included in the random access unit specified by said random access unit specification unit, and

the sequence starts with a special picture at which all statuses needed for decoding are reset, and the sequence is made up of pictures that starts with a special picture and ends with a picture that is placed immediately before a next special picture.

27. A moving picture decoding method for decoding and playing back, a stream including pictures that constitute a moving picture, said method comprising:

obtaining an instruction indicating that trick-play should be performed;

analyzing, by demultiplexing, supplemental information on a

random access unit basis, each random access unit constituting the stream;

specifying pictures, among pictures included in each random access unit, which are needed for trick-play indicated by the instruction obtained in said obtaining, based on an analysis result obtained by said analyzing; and

decoding and playing back the pictures specified by said specifying,

wherein, at a top of each random access unit, an intra coded picture that can be decoded without depending on any picture is placed, and

the supplemental information includes information for specifying pictures to be decoded at the time when the pictures included in each random access unit are played back in trick-play.

28.   A program for a moving picture decoding apparatus for decoding and playing back a stream including coded pictures that constitute a moving picture, the program causing a computer to execute a moving picture decoding method which includes:

obtaining an instruction indicating that trick-play should be performed;

analyzing, by demultiplexing, supplemental information on a random access unit basis, each random access unit constituting the stream;

specifying pictures, among pictures included in each random access unit, which are needed for trick-play indicated by the instruction obtained in said obtaining, based on an analysis result obtained by said analyzing; and

decoding and playing back the pictures specified by said specifying,

wherein, at a top of each random access unit, an intra coded picture that can be decoded without depending on any picture is

placed, and

the supplemental information includes information for specifying pictures to be decoded at the time when the pictures included in each random access unit are played back in trick-play.

29.   A stream comprising pictures that constitute a moving picture,

wherein each random access unit includes a supplemental information to be referred to at the time of playback of the random access unit, each random access unit including one or more pictures,

at a top of each random access unit, an intra coded picture that can be decoded without depending on any picture is placed, and

the supplemental information includes information for specifying pictures to be decoded at the time when the pictures included in each random access unit are played back in trick-play.

30.   A computer-readable recording medium comprising a stream which includes

pictures that constitute a moving picture,

wherein each random access unit includes the supplemental information to be referred to at the time of playback of the random access unit, each random access unit including one or more pictures,

at a top of each random access unit, an intra coded picture that can be decoded without depending on any picture is placed, and

the supplemental information includes information for specifying pictures to be decoded at the time when the pictures included in each random access unit are played back in trick-play.

31.   An integrated circuit for generating a stream including pictures that constitute a moving picture, said integrated circuit comprising:

a supplemental information generation unit operable to

generate, on a random access unit basis, supplemental information to be referred to at the time of playback of each random access unit, each random access unit including one or more pictures; and

a stream generation circuit unit operable to generate a stream including the generated supplemental information and the pictures by adding the supplemental information to each corresponding random access unit,

wherein, at a top of each random access unit, an intra coded picture that can be decoded without depending on any picture is placed, and

the supplemental information includes information for specifying pictures to be decoded at the time when the pictures included in each random access unit are played back in trick-play.